

# PATRICK HUEMBELI

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## Research Consultant (*Noumenal*)

Dec 2025 - now

1. Contributing to investor materials and fundraising strategy for an Active Inference robotics startup recasting control and action selection as probabilistic inference
2. Collaborating on mapping algorithmic requirements to probabilistic hardware accelerators in partnership with hardware providers. (e.g. Extropic)
3. Supporting development of reinforcement learning and Active Inference models, contributing to core components of the software stack

## Lead AI Scientist (*Axiomatic AI*)

Nov 2024 - Nov 2025

Accelerating Scientific Discovery by:

1. Building agentic tools. Including, document analyzing tools (summary, figure analysis, annotation), RAG and knowledge graph systems for efficient database query, coding agents for scientific modeling.
2. Agentic automation of measurement and data analysis of scientific experiments.
3. Developing measurement-aware design strategies that integrate real-world data into fabrication processes to enhance resilience against production noise and fabrication tolerances.
4. Coordinating with cross-functional teams to streamline the design pipeline, from initial prototyping to testing and deployment.
5. Team Lead of a team of ML research engineers, SWEs and scientists. Doing technical guidance, hiring, management.

## Staff Scientist (*Extropic.ai*)

Feb 2023 - Nov 2024

1. Developed a platform for probabilistic graphical models using energy-based models (EBMs) for factor graphs, addressing tasks such as time series forecasting, sensor fusion, and multi-modal probabilistic modeling. Contributed to the theory, built a Python/JAX library and managed projects.
2. Run SDE simulations to model subthreshold CMOS hardware under thermal noise. Build a framework to efficiently run these simulations.
3. Integrated classical probabilistic graphical models with MCMC sampling libraries and hardware accelerators to explore various use cases.

## Senior Scientist: Quantum Computing (*Menten.ai*)

April 2022 - January 2023

Research in Quantum Computing applied to protein design. Mainly focused on generative tasks connected to protein design. We had a collaboration with Nvidia on one of our projects on [quantum GANs](#).

## Post-Doc in Physics (*EPFL*)

April 2021 - April 2022

Post-Doc in the Computational Quantum Science Laboratory of Giuseppe Carleo together with IBM. We investigate how to combine generative probabilistic machine learning models with quantum computing.

## PROFESSIONAL EDUCATION

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**PhD in Physics** (*ICFO - The Institute of Photonic Sciences*) 2017-2021  
PhD in the Quantum Information Theory Group of Antonio Acín, with the title “[Machine learning for quantum physics and quantum physics for machine learning](#)”. Finished with excellent grade (summa cum laude).

**MSc and BSc in Physics** (*University of Basel*) 2011-2016  
Master and Bachelor in general physics with focus on quantum information and measurement. I wrote my [master thesis](#) in the Condensed Matter Theory Group of Christoph Bruder on parity measurements in superconducting qubits

## OTHER EXPERIENCE

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**Recruiting** (*Creative Destruction Lab - Toronto*) January 2020 - August 2020  
Evaluating possible candidates for the CDL startup incubator [quantum stream](#), which involves doing research on the applicants' background or a startup's technology to evaluate if it is of interest to the CDL.

**Teaching** (*Creative Destruction Lab - Toronto*) July 2019  
Teaching quantum machine learning in the boot-camp of the QML stream of the Creative Destruction Lab in Toronto. This included basic introduction to quantum computing and how to program near term quantum devices such as IBM Q, DWAVE, Rigetti and Xanadu.

**Visiting Researcher** (*University of Toronto - Toronto*) May-July 2019  
Visiting the group of Prof. Peter Wittek at University of Toronto to work on several topics in quantum assisted many-body physics and the application of statistical methods for a better understanding of deep learning.

**Visiting Researcher** (*Xanadu - Toronto*) February 2019  
Visiting the quantum computing start-up Xanadu in Toronto where I worked with Nathan Killoran, Juan Miguel Arrazola, Masoud Mohseni and Peter Wittek on the "Physics of Boltzmann machines".

**Teaching** (*Creative Destruction Lab - Toronto*) July 2018  
Teaching quantum machine learning in the boot-camp of the QML stream of the Creative Destruction Lab in Toronto. This included basic introduction to quantum computing and how to program near term quantum devices such as DWAVE and Rigetti.

**Visiting Grad Student** (*Perimeter Institute - Waterloo*) May - September 2018  
Visiting the group of Roger Melko and studying restricted Boltzmann machines and their application on quantum state tomography for binary, multinomial and continuous variable systems.

**Teaching Assistant** (*UPC - Barcelona*) Fall 2017  
Teaching assistant in quantum machine learning. This included helping students in machine learning programming exercises with code revisions, software troubleshooting and theoretical support.

**Teaching Assistant** (*University of Basel*) Spring 2015/16, Fall 2015  
Teaching assistant for the courses “Complex Analysis and Vector Analysis” and “Differential Equations” at University of Basel. This included solving and correcting the weekly exercise sheets and presenting them once a week to a class of about 20 students.

**Teaching Assistant** (*University of Basel*) Spring 2015  
Teaching assistant in the 1st semester lab course in physics.



## **HONORS AND AWARDS**

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- Member of the IBM Quantum Researchers Program
- Marie Skłodowska-Curie-Cofund under the European Union's Horizon 2020 research and innovation program
- Qiskit European Champion 2019